

IN THE CLAIMS:

The text of all pending claims are set forth below. Cancelled claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strikethrough~~. The status of each claim is indicated with one of (original), (currently amended), (previously presented), (cancelled), (withdrawn), or (new).

Please AMEND the claims in accordance with the following:

1. (Currently Amended) An automated fingerprint data synthesis method, comprising ~~the steps of:~~

extracting minutiae from each of a plurality of fingerprint images to produce respective fingerprint data sets including information regarding the minutiae for each of the respective fingerprint images;

investigating a correspondence of the minutiae between the plurality of fingerprint data sets to search for ~~the substantially~~ same minutiae ~~that included commonly in two or more of the~~ plurality of fingerprint data sets as have in common minutiae; and

~~selecting selectively determining which one minutiae~~ of the common minutiae to use as ~~a minutia-representatives~~ of the common minutiae to synthesize the plurality of fingerprint data sets to produce one synthetic fingerprint data set, the synthetic fingerprint data set comprising minutiae such that each of the two or more fingerprint data sets provide selectively determined minutiae that represent corresponding same minutiae in one or more of the other fingerprint data sets; and

~~validating the synthetic fingerprint data.~~

2. (Original) A fingerprint data synthesis apparatus, comprising:

a fingerprint data extraction section for extracting minutiae from each of a plurality of fingerprint images to produce fingerprint data including information regarding the minutiae for each of the fingerprint images;

a fingerprint data storage section for storing the plurality of fingerprint data produced by said fingerprint data extraction section;

a common minutia searching section for investigating a correspondence of the minutiae between the plurality of fingerprint data to search for the same minutiae included commonly in two or more of the plurality of fingerprint data as common minutiae;

a fingerprint data synthesis section for selecting one of the common minutiae as a minutia representative of the common minutiae to synthesize the plurality of fingerprint data to produce one synthetic fingerprint data; and

a validation section for validating the synthetic fingerprint data.

3. (Original) The fingerprint data synthesis apparatus as claimed in claim 2, wherein said validation section confirms at least one of validity of a range of presence of the minutiae in the synthetic fingerprint data, validity of one-sidedness of presence of the minutiae in the synthetic fingerprint data, validity of relational information between the minutiae in the synthetic fingerprint data and validity of the number of the minutiae in the synthetic fingerprint data to validate the synthetic fingerprint data.

4. (Currently Amended) The fingerprint data synthesis apparatus as claimed in claim 3, wherein said validation section numerically evaluates and confirms any of the criteria of validity and determines the validity of the synthetic fingerprint data based on the one or more evaluation value or values of obtained by numerically evaluating the validity.

5. (Original) The fingerprint data synthesis apparatus as claimed in claim 2, further comprising a minutia reliability calculation section for calculating a reliability value of each of the minutiae of the plurality of fingerprint data, and wherein said fingerprint data synthesis section selects the minutia representative of the common minutiae based on the reliability values calculated by said minutia reliability calculation section.

6. (Original) The fingerprint data synthesis apparatus as claimed in claim 5, wherein said minutia reliability calculation section calculates the reliability value of each of the minutiae based on a difference between an orientation of the minutia and an orientation of a ridge.

7. (Original) The fingerprint data synthesis apparatus as claimed in claim 5, wherein said minutia reliability calculation section calculates the reliability value of each of the minutiae

based on a length of a ridge or a distance from the minutia to a neighboring minutia.

8. (Original) The fingerprint data synthesis apparatus as claimed in claim 5, wherein said minutia reliability calculation section calculates the reliability value of each of the minutiae based on a distance from the minutia to a neighboring ridge.

9. (Original) The fingerprint data synthesis apparatus as claimed in claim 5, wherein said minutia reliability calculation section calculates the reliability value of each of the minutiae based on a positional relationship of the minutia to a neighboring minutia.

10. (Original) The fingerprint data synthesis apparatus as claimed in claim 5, further comprising a verification section for verifying the plurality of fingerprint data, and wherein said minutia reliability calculation section calculates, for each of the minutiae in the plurality of fingerprint data, a verification coincidence evaluation value for evaluation of verification coincidence possibility of the minutia as the reliability value based on a result of the verification by said verification section.

11. (Original) The fingerprint data synthesis apparatus as claimed in claim 10, wherein said minutia reliability calculation section calculates the verification coincidence evaluation value based on at least one of results of verification of two minutiae of an object of verification with regard to a position, a type and an orientation by said verification section.

12. (Original) The fingerprint data synthesis apparatus as claimed in claim 10, wherein said minutia reliability calculation section calculates the verification coincidence evaluation value based on a result of verification of two minutiae of an object of verification with regard to relational information between each of the verification object minutiae and another minutia by said verification section.

13. (Original) The fingerprint data synthesis apparatus as claimed in claim 12, wherein the relational information is at least one of a position, a type and an orientation of the other minutia.

14. (Original) The fingerprint data synthesis apparatus as claimed in claim 12, wherein the relational information is the number of ridges from each of the minutiae of the verification object to the other minutia.

15. (Original) The fingerprint data synthesis apparatus as claimed in claim 12, wherein the relational information is a connection pattern from each of the minutiae of the verification object to the other minutia along a ridge.

16. (Original) The fingerprint data synthesis apparatus as claimed in claim 10, wherein said minutia reliability calculation section calculates the number of times of verification coincidence of each of the minutiae as the verification coincidence evaluation value.

17. (Original) The fingerprint data synthesis apparatus as claimed in claim 5, wherein said minutia reliability calculation section modifies the reliability value of each of the minutiae based on the reliability value or values of a neighboring minutia or minutiae.

18. (Original) The fingerprint data synthesis apparatus as claimed in claim 10, wherein said verification section functions also as said common minutia searching section.

19. (Original) The fingerprint data synthesis apparatus as claimed in claim 10, wherein said fingerprint data synthesis section refers to a result of the verification of relational information between each of the minutiae and another minutia by said verification section, and collects that relational information which has high reliability to produce synthesized relational information, and uses the synthesized relational information as the relational information of the minutiae from which the synthetic fingerprint data are formed.

20. (Original) The fingerprint data synthesis apparatus as claimed in claim 2, wherein, when said fingerprint data synthesis section produces the synthetic fingerprint data, said fingerprint data synthesis section performs positioning of the minutiae from which the synthetic fingerprint data are produced with reference to a minutia included commonly in the plurality of fingerprint data.

21. (Currently Amended) The fingerprint data synthesis apparatus as claimed in claim 2, wherein, when said fingerprint data synthesis section produces the synthetic fingerprint data, said fingerprint data synthesis section performs positioning of the minutiae from which the synthetic fingerprint data are produced with reference to the ~~center~~core of a fingerprint determined from each of the fingerprint images.

22. (Original) The fingerprint data synthesis apparatus as claimed in claim 2, wherein, when said fingerprint data synthesis section produces the synthetic fingerprint data, said fingerprint data synthesis section performs positioning of the minutiae from which the synthetic fingerprint data are produced with reference to a minutia selected from among the minutiae included in the synthetic fingerprint data being produced.

23. (Original) A computer-readable recording medium on which a fingerprint data synthesis program is recorded for causing a computer to function as:

a fingerprint data extraction section for extracting minutiae from each of a plurality of fingerprint images to produce fingerprint data including information regarding the minutiae for each of the fingerprint images;

a common minutia searching section for investigating a correspondence of the minutiae between the plurality of fingerprint data to search for the same minutiae included commonly in two or more of the plurality of fingerprint data as common minutiae;

a fingerprint data synthesis section for selecting one of the common minutiae as a minutia representative of the common minutiae to synthesize the plurality of fingerprint data to produce one synthetic fingerprint data; and

a validation section for validating the synthetic fingerprint data.

24. (Original) A biometric information synthesis method, comprising the steps of:
extracting feature elements from each of a plurality of sets of raw biometric data obtained from the same organism to produce biometric information including information regarding the feature elements for each of the sets of raw biometric data;

investigating a correspondence of the feature elements between the plurality of biometric information to search for the same feature elements included commonly in two or more of the sets of biometric information as common feature elements;

selecting one of the common feature elements as a feature element representative of the common feature elements to synthesize the plurality of biometric information to produce one synthesized biometric information; and
validating the synthesized biometric information.

25. (New) A method according to claim 1, further comprising validating that the synthetic fingerprint data is valid as fingerprint data.

26. (New) A method of producing a synthetic fingerprint data set to be used for fingerprint verification, the method comprising:

extracting a first set of minutiae from a first fingerprint image of a fingerprint;

extracting a second set of minutiae from a second fingerprint image of the fingerprint;

and

creating a synthetic fingerprint data set by selectively determining which minutiae that are common to both sets are to be included in the synthetic fingerprint data set as representative of their corresponding counterparts in the other set.

27. (New) A method according to claim 26, wherein the determining is based on the minutiae common to both sets.

28. (New) A method according to claim 26, wherein the determining comprises determining for individual common minutiae whether or not to include the minutiae in the synthetic fingerprint data.

29. (New) A method according to claim 26, wherein the selective determining is based on reliability measures of the common minutiae.

30. (New) A method according to claim 26, further comprising automatically analyzing the synthetic fingerprint data set to determine whether it is a valid representation of the fingerprint.